

What is claimed is:

1. A high frequency dithering probe for a high speed scanning probe microscope, comprising:

5 a high frequency quartz-crystal resonator having a fundamental resonant frequency in the range of 1MHz ~100MHz and a thickness of 0.01mm~2.0mm;  
an electrode attached to the quartz-crystal resonator; and  
a probe attached to the quartz-crystal resonator.

10 2. The high frequency dithering probe of claim 1, wherein the quartz-crystal resonator is formed in a flat disk type shape with a thickness of scores of mm<sup>2</sup>.

15 3. The high frequency dithering probe of claim 1, wherein the probe is attached on the surface of the quartz-crystal resonator.

4. The high frequency dithering probe of claim 3, wherein the probe is a cantilever attached to the quartz-crystal resonator.

20 5. The high frequency dithering probe of claim 3, wherein the probe is a sharpened optical fiber tip.

6 The high frequency dithering probe of claim 3, wherein the probe is a tungsten tip.

7. The high frequency dithering probe of claim 3, wherein the probe is a carbon nanotube.

8. The high frequency dithering probe of claim 3, wherein the  
5 scanning probe microscope is a noncontact mode atomic force microscope (AFM).

9. The high frequency dithering probe of claim 3, wherein the probe is made of a transparent material to transmit light therethrough.

10. The high frequency dithering probe of claim 1, wherein the probe is attached to the quartz-crystal resonator in such a manner that it extends through a hole formed in the high frequency quartz-crystal resonator.

11. The high frequency dithering probe of claim 10, wherein the probe  
15 is an optical fiber tip.

12. The high frequency dithering probe of claim 10, wherein the scanning probe microscope is a noncontact mode atomic force microscope (AFM).

13. The dithering probe of claim 10, wherein the scanning probe  
20 microscope is a near field scanning optical microscope (NSOM).

14. The high frequency dithering probe of claim 10, wherein the probe is made of a transparent material to transmit light therethrough.

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15. The high frequency dithering probe of claim 14, wherein the electrode is removed at the portion of the quartz-crystal resonator where the probe is attached to.

5 16. The high frequency dithering probe of claim 14, wherein the electrode is transparent.

10 17. The dithering probe of claim 14, wherein the scanning probe microscope is a near field scanning optical microscope (NSOM).